

Comments on desired diagnostic for high-intensity rings

A. Fedotov

October, 2002

Basic devices and measured properties



Device	Measured property
Intensity measurement:	
Beam transformer, WCM	Transverse : intensity, position Longitudinal : beam structure
Position:	
Pick-ups	Transverse : position Longitudinal : size, emittance
Profile:	
WS, IPM, SEM, ScinSc, Scrapers	Size, shape, emittance, position
Beam loss monitors	
Emittance measurements	
Energy measurements	
E-detectors	

Examples



RHIC:

Current transformers

WCM

BLM

BPM

WS, IPM

E-detectors

Tune measurements

BIG

Luminosity monitors

SNS:

Current transformer

WCM

BLM

BPM

WS, IPM

E-detectors

Tune measurements

BIG

Diagnostic requiring special treatment for high-intensity rings



General features:

- Most of diagnostic should cover wide range of intensities as a result of accumulation. Should be capable to produce reliable measurements at high-intensity.
- Beam loss
- Beam halo
- Beam in gap
- Clearing electrodes, E-detectors
- Beam profile measurements
- Incoherent tune measurements

Special diagnostic



- **Incoherent tune-spread measurements** – necessary to understand beam losses at high-intensity operation (several ways of measuring are available, such as Schottky, Quadrupole pick-up, injection oscillation, BTF, etc.).
- **Profile measurements**: standard WS will have heating problems for high-intensity measurements, IPM can provide desired profiles (Are there any concerns with its operation at high intensity?). Other devices to be considered for high intensity Flying Wire, Luminescence monitor.
- **Halo measurements**: essential for understanding beam loss; requires profiles measurements of beam tails 4 orders of magnitude below the peak beam intensity (Scrapers, PLL ?).